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ABSTRACT

Educable mentally retarded students were taught a verbal mediation learning strategy to determine if their performance pattern would correspond to learning potential designations derived with nonverbal materials. In comparisons of regular and special class groups using a picture paired-associates learning task, special class high-scorers performed better than gainers and nongainers and did not differ from regular class subjects, thus following the nonverbal learning potential pattern. Verbal mediation training improved the performance of all learning potential groups, as well as the regular class groups, but contrary to prediction, no differential effects were found and no learning potential group was able to give evidence of using the strategy in subsequent testing. It was suggested that educable mentall retarded students have a verbal production (Expressive) deficit rather than a mediation deficit. (For related studies, see also EC 042 065 and 042 067.) (Author/CB)

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STUDIES IN LEARNING POTENTIAL

Learning Potential Status and Verbal Mediation Training
with Educable Mentally Retarded Students

by

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Summary and Abstract

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Educable mentally retarded students were taught a verbal mediation learning strategy in order to determine if their pattern of performance would correspond to learning potential designations derived with nonverbal materials. It was predicted that high-able subjects by the learning potential criterion (gainers and high scorers) would profit more from verbal mediation training than would low-able subjects (nongainers) and would provide more inferential evidence of spontaneous application of the strategy in subsequent testing. In comparisons of regular and special class groups using a picture paired-associates learning task, special class high-scorers performed better than gainers and nongainers and did not differ from regular class subjects, thus following the nonverbal learning potential pattern. Verbal mediation training improved the performance of all learning potential groups, as well as the regular class groups, but contrary to prediction, no differential effects were found and no learning potential group was able to give evidence of using the strategy in subsequent testing. It was suggested that educable mentally retarded students have a verbal production (expressive) deficit rather than a mediation deficit.

Learning Potential Status and Verbal Mediation Training with Educable Mentally Retarded Students[1]

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Psychometric IQ scores have failed to predict nonacademic post-school performance among educable mentally retarded children of low socio-economic status (Kennedy, 1966). Assuming that success in the post-school years requires an ability to learn and to reason not directly tapped by the intelligence tests, Budoff (1970) developed a "learning potential" assessment procedure to assess these general process variables more directly. In essence, the learning potential evaluation seeks to impose some control over the potentially negative effects of the life experiences and motivation of a child from a non-middle class social background by minimizing the artificiality of the test situation, the negative affect associated with school materials, and the possibly unfamiliar content of the usual tests. Using reasoning problems such as Kohs' Block Designs, the evaluation provides the child with the opportunity to develop and demonstrate his competence over successive phases which consist of: (a) a pretest appraising a child's initial functioning with the learning potential materials, (b) a coaching phase in which the child is given intensive instruction and practice with test-like materials involving principles appropriate to adequate test performance, and (c) an immediate and a delayed posttest to ascertain changes in test performance as a function of the training. In this evaluation

context retarded children have exhibited three basic patterns of performance defining their learning potential status: Those children whose initially poor performance fails to improve as a result of coaching (non-gainers), those children whose initially poor performance improves markedly as a function of coaching (gainers), and those children whose initial performance is comparable to that of the nonretarded chronological age peers (high scorers).

The validity of the learning potential evaluation was demonstrated in a study comparing special class educable retarded children with low and average-achieving chronological age peers (Budoff, Meskin, & Harrison, 197). Learning potential, rather than IQ or class assignment, significantly accounted for differences in nonverbal evidence of mastery of principles of electricity acquired in a classroom science unit adapted to minimize verbal demands. High scorers learned more than gainers who, in turn, learned more than nongainers. Special class nongainers and gainers, but not high scorers, performed more poorly than the nonretarded groups when asked to give reasons for their empirically correct choices. The retarded students gave fewer causal explanations than the nonretarded groups. Budoff, et al. concluded that the special class gainers and high scorers were educationally retarded, rather than mentally retarded, although they appeared to suffer a verbal-expressive deficit, or more generally, a verbal mediation deficit.

The learning potential procedure provides an estimate of whether an educable retarded child can be taught a nonverbal learning strategy and whether he will subsequently use that strategy spontaneously. Gainers and high scorers demonstrate acquisition and use of nonverbal

problem-solving strategies during the learning potential evaluation. If verbal mediation may be considered a learning strategy, it can be examined in a manner analogous to the learning potential paradigm. The verbal data of Budoff et al.'s study suggests the typical pattern of pretest performance, i.e., nongainers and gainers were, in general, verbally inferior to the high scorers who were generally comparable to their nonretarded peers in number of verbal reasons offered. If verbal mediation were explicitly taught as a learning strategy and subsequently tested for spontaneous application, would the resulting pattern of performance correspond to the learning potential designations derived with nonverbal materials? If so, it would be predicted that gainers and high scorers would profit more from the teaching of a verbal mediation strategy than would nongainers, and they would be more likely than nongainers to provide inferential evidence of spontaneous application of the strategy in subsequent testing. The present study sought to test these predictions.

Design of the Study

In Phase I of the experiment nongainers, gainers, and high scorers in special classes for the educable mentally retarded were given a picture paired-associates pretest under nonmediational instructions. Two groups from each learning potential category were matched on the basis of Phase I performance. In Phase II the experimental mediation groups learned a second list under mediational instructions to construct sentences containing the stimulus and response items, while the practice control groups learned the second list under experimentally neutral instructions.

In Phase III a third list was learned by all groups under neutral instructions to determine the spontaneous effects of prior instructions to use mediational strategies. The three phases corresponded analogously to the phases of a learning potential evaluation. Interpolated between Phases II and III was a test of recall and relearning of the Phase I list. Recall and relearning were included to tap memory functions and to help isolate factors contributing to effects of mediational instructions. The special class children were also compared with nonretarded chronological age peers on performance in Phases I and II.

Method

Subjects

The male subjects were drawn from a special school for the mentally retarded and from the regular classes (grades 7 - 8) of a junior high school, both serving the same low income, white, urban community. The learning potential status of the children in the special school had previously been determined by Budoff's learning potential procedures. The final samples consisted of ten children drawn from each of the three learning potential classifications: nongainers (NG), gainers (G), and high scorers (HS). The special class subjects' chronological ages (CA) ranged from 135 months to 193 months and their WISC IQ scores, determined within one year of the study, ranged from 62 to 103. The final samples of regular class children consisted of ten low-achieving boys and ten average-achieving boys. Their CAs ranged from 144 months to 192 months, and their group IQ scores ranged from 85 to 116. Low achievement was defined as a grade-

point average (GPA) of 1.5 or less based on most recent grades in language arts, mathematics, natural science and social science. Grade point was determined on the basis of F = 0 to A = 4 with intermediate plus and minus values of .33 added or subtracted from the numerical letter grade equivalent. Average achievement was defined as a GPA between 1.75 and 2.75. The means and standard deviations of CA and IQ for the five ability groups in experimental and control conditions appear in Table 1. In addition to the final sample of 50 subjects, 1 nongainer and 2 low achieving children were excluded from the study, because they learned the first paired associates list with 10 or fewer errors, a criterion for exclusion.

Materials and Apparatus

The stimulus and response items consisted of 35 mm black and white slides showing hand drawn pictures of common objects. Many items were taken from the Peabody Picture Vocabulary Test (Dunn, 1959) while others were created for the task. Three 18-item lists were constructed: List I, List II, and List III (see Table 2) for use in Phases I, II and III, respectively. Four different orders of stimulus presentation were used to minimize serial learning. The four sequences contained no repetitions of contiguous items. The slides were rear-screen projected from a Kodak 800 Carousel projector in a Radiant "Univision" rear-screen projection box. Three sets of training items were mounted on 8 x 10 inch black flash cards.

Procedure

Both the special class children and the regular class children participated in the first two phases of the study. In Phase 1

Table 1

Means and Standard Deviations (SD) for Chronological Age (CA) and IQ of Subjects in Ten Experimental Subgroups (N = 5/group)

	CA		IQ	
Group	mean	SD	mean	SD
Experimental				
NG	148.60	10.21	74.00	8.15
G	156.20	16.45	82.80	11.45
HS	167.40	16.13	83.80	3.19
Low	170.80	9.47	91.80	5.17
Aver.	167.60	15.82	97.00	9.54
Control				
NG	175.60	14.88	72.60	6.99
G	152.40	15.50	77.60	12.74
HS	164.00	11.31	84.20	10.89
Low	171.80	16.47	94.80	4.82
Aver.	161.20	3.42	108.00	7.65

Table 2

	List I		List II		List III	
	S	R	S	R	S	R
1.	chair	pin	table	dog	door	hammer
2.	mitten	sink	hook	glove	ladder	pipe
3.	leaf	arrow	tree	stove	sandwich	tent
4.	knife	cow	spoon	gun	bed	comb
5.	car	axe	saw	wagon	stoplight	letter
6.	ball	bucket	sock	bell	parachute	vacuum
7.	banana	drum	fish	bulb	statue	pitcher
8.	flag	lamp	butterfly	sailboat	mountain	bird nest
9.	ring	broom	fan	nail	seal	spider web
10.	can	pencil	clown	fence	rope	moon
11.	tire	umbrella	shovel	keys	towel	log
12.	bat	ear	bicycle	finger	hanger	glasses
13.	turtle	castle	kite	globe	slide	luggage
14.	chicken	coat	axe	television	bag	chain
15.	feather	snake	net	hydrant	telephone	church
16.	fly	watch	horse	scissors	plant	totem
17.	guitar	train	corn	tie	santa	spring
18.	money	iron	slingshot	pie	camera	candle

all subjects were individually administered an 18-item visual paired-associates task under identical conditions. Subjects within each ability grouping (NG, G, HS, low achievers, and average achievers) were matched on errors and assigned to either an experimental verbal mediation condition or a control condition in Phase II which was given two weeks after Phase I. Children in the special classes, but not the regular classes, were given a test of strategy generalization (Phase III) four weeks after Phase II. The special class children were also given tests of recall and relearning of List I between Phases II and III.

The paired-associates task was administered using a study-test paradigm to avoid confounding learning and recall, i.e., the subject studied the entire list and then was tested without feedback. The child controlled the rate of stimulus presentation during study and test trials, pacing himself as he wished. On the first exposure to the stimulus material the subject was asked to name the pictures. Whatever label the subject used, or any synonym for his label, or a "standard" label used by the experimenter was accepted as a correct response on subsequent testing. The subject was instructed at the beginning of each phase that he was earning points towards a free movie ticket if he did well. Testing was discontinued after one errorless trial or after five trials, and the subject's score was the number of errors made within either limit. The specific instructions used in the study appear in Appendix A.

Phase I. The subject was pretrained with three examples via flashcards. First, he was shown a study S-R pair, asked to name

each picture, and told to remember that the pictures went together, so that when he was shown the first picture of the pair he could tell the experimenter which picture went with it. After presenting each of the three examples individually in study-test fashion, i.e.,one-item PA list, the three study pairs were again presented, and the subject was then tested with the stimulus cards, a three-item list. All subjects remembered at least one response correctly, the criterion for inclusion in the experiment.

After pretraining, the subject was introduced to the projection unit and told that he would run the machine himself by pressing a button that the experimenter gave him. The subject was again reminded of the associative learning demand of the task, and told that he would be shown a number of picture pairs which he was to name and study for subsequent testing. On the second study trial he was told to study the pictures any way he wished, either aloud or silently.

Phase II. Two weeks later all subjects were given identical instructions to remind them of the task requirements. Both control and experimental mediation subjects were asked to label the pair of pictures in one of the pretraining example items and to remember that they went together. In addition, on the first study trial the experimental subjects were asked to make up a sentence about each pair of pictures. The experimenter provided a logical and an illogical example, e.g., "The book fell on the icecream cone," and, "The book was eating the icecream cone." They were told to make each of the sentences different from one another and to use the sentences to help them remember the picture pairs. On the second study trial all subjects were told to study in any manner they wished.

Recall and Relearning

Two weeks after Phase II the special class subjects were individually shown the test stimuli from List I and asked which picture went with it. Following this recall test they were given up to four trials to relearn the list under neutral, nonmediating instruction to study the list silently. They were not asked to name the pictures on the first study trial. Data for both recall and relearning were the number of errors made. In addition, the errors were scored for stimulus or response intrusions from List II.

Phase III. Finally, two weeks after the recall test, the subjects were given a new list and asked to learn it under the neutral, nonmediation instruction. Rather than having the child name the pictures on the first study trial, he was shown in advance a photocopy of the pictures to name. The pictures were unsystematically arranged and independent of the PA lists' associations. The new list was learned to one errorless trial or to a limit of five trials, and the subject's score was the number of errors made to either limit.

Results

Performance of Special Class and Regular Class Children

Means and standard deviations (SD) of errors to criterion on the paired associates tasks made by subjects in the five subject classifications appear in Table 3. A repeated measures analysis of variance was performed on the 5 x 2 x 2 design which included the following factors: ability groups (nongainer, gainer, high scorers, low and average achievers), treatment (mediation versus control), and Phase (Phase I versus Phase II) which was the repeated

Table 3

Means and SDs of Errors to Criterion for the Ten Subgroups

Group	Phase I mean	Phase I SD	Phase II mean	Phase II SD	Phase III mean	Phase III SD
Experimental						
NG	56.20	18.70	15.60	10.38	43.60	18.20
G	55.80	13.74	11.60	13.35	42.40	15.58
HS	34.20	15.61	5.40	8.26	17.60	15.96
Low	26.20	10.38	1.40	1.67		
Aver.	27.60	13.07	.80	.45		
Control						
NG	55.00	17.23	46.80	20.44	36.60	22.01
G	56.80	15.35	53.40	17.56	41.40	17.64
HS	32.60	12.54	25.60	10.71	16.20	9.68
Low	26.60	8.05	18.80	6.94		
Aver.	26.40	9.99	22.80	11.45		

measures factor. The results of this analysis are summarized in Table 4.

Although there was a significant main effect for ability groups (F = 12.59, df = 4/40, p <.001), there were no interactions of ability groups with treatments or phase. Multiple pairwise comparisons were made between ability groups using the Scheffé's test and the .05 level of significance. No significant differences were found between gainers and nongainers nor among high scorers, low and average achievers. Gainers and nongainers made significantly more errors than the other three groups.

The significant phase x treatments interaction (F = 71.42, df = 1/40, p <.001) was evaluated by repartitioning the sums of squares and degrees of freedom for treatments and the phase x treatments interaction. As expected, within Phase I there was no difference between the experimental groups and the control groups (F < 1.0). Within Phase II, the experimental mediation groups made fewer errors than the controls on the paired-associates task (F = 137.58, df = 1/40, p <.001).

The amount of time spent studying the lists on the first study trial was also analyzed using the same 5 x 2 x 2 design. Means and standard deviations of the study time measure used (1/study time x 1000) are reported in Table 5. The results of the analysis of variance are summarized in Table 6. In this and several other analyses, missing data was treated by substituting the mean of the group and reducing the error degrees of freedom.

Two questions regarding study-time data were of interest.

Table 4

Analysis of Variance Summary Table:
Errors to Criterion in the Paired Associates Learning
of the Five Ability Groups

Source	df	MS	F
Between	49		
Treatments (A)	1	4225.0000	15.9253*
Ability Groups (B)	4	3340.7150	12.5922*
A X B	4	139.7750	.5268
Error (B)	40	265.3000	
Within	50		
Phases (R)	1	9525.7600	148.8865*
A X R	1	4569.7600	71.4248*
B X R	4	92.2350	1.4416
A X B X R	4	112.8350	1.7635
Error (W)	40	63.9800	
Total	99		

*$p < .001$

Table 5

Means and SDs of Study Time ($\frac{1}{\text{study time X 1000}}$) on Trial 1

Groups	Phase I		Phase II	
	mean	SD	mean	SD
Experimentals				
NG	6.36	2.20	4.05	1.68
G	10.02	5.21	3.06	.80
HS	7.60	5.96	4.36	1.80
Low	15.91	7.56	10,80	8.63*
Aver.	9.35	5.25*	4.27	2.36
Controls				
NG	9.28	2.68	17.95	8.68
G	7.54	2.81	14.65	5.37
HS	8.20	1.54	14.17	2.75
Low	16.20	7.31	13.79	9.85
Aver.	17.16	4.19	14.10	1.85

Note: Values are based on 5 observations per group except those denoted with an asterisk. In the latter groups, one observation was missing and the untransformed mean of the group was substituted.

Table 6

Analysis of Variance Summary Table:

Study Time ($\frac{1}{\text{study time X 1000}}$) on Trial 1

Source	df	MS	F
Between	49		
Treatments (A)	1	819.3067	22.3242**
Ability groups (B)	4	108.5290	2.9571*
A X B	4	43.8106	1.1937
Error (B)	40	36.7003	
Within	48		
Phase (R)	1	10.2610	.5644
A X R	1	379.9958	20.9016**
B X R	4	50.7637	2.7922*
A X B X R	4	34.6125	1.9039
Error (W)	38	18.1802	
Total	97		

*$p < .05$

**$p < .001$

First, were there differences among ability groups in the time which they required to create mediating sentences from which difficulty in verbal mediation might be inferred? The absence of a significant ability group x treatment x phase interaction indicated no differences. Secondly, were there differences among ability groups in the amount of time spent studying under non-mediation instructions? The relevant ability groups x phase interaction obtained (F = 2.79, df = 4/38, $p < .05$) supported further evaluation of the question. The sums of squares and degrees of freedom for the effects of ability groups and the ability groups x phase interaction were repartitioned and the differences among ability groups within Phase I analyzed against an error MS = 24.67 (df = 39) computed independently for Phase I. This analysis found significant differences in study time among ability groups within Phase I (F = 5.59, df = 4/39, $p < .005$). Multiple comparisons using Scheffé's test and the .05 level of significance revealed no differences among the three learning potential groups and the average achievers. All three learning potential groups studied the list significantly longer than the low achievers. The low and average achievers did not differ significantly from each other.

Performance of Special Class Children as a Function of Learning Potential

A repeated measures analysis of variance was performed on errors to criterion according to a 3 x 2 x 3 design which included the following factors: learning potential (nongainers, gainers, and high scorers), treatment (mediation versus control), and phases

(3 levels repeated measures factor). The result of this analysis are summarized in Table 7.

A significant main effect for learning potential (F = 7.75, df = 2/24, $p < .005$) was obtained. Pairwise comparisons with the Scheffé test and .05 level of significance showed that the high scorers made significantly fewer errors than the gainers or nongainers, and that the latter groups did not differ between each other.

A significant treatments x phase interaction was obtained (F = 34.01, df = 2/48, $p < .001$). Comparisons of mediation versus control conditions were made within each level of phase against error terms computed for each phase. The two groups did not differ on either Phase I ($F < 1$) or Phase III ($F < 1$). In Phase II the mediation group made significantly fewer errors than the control group (F = 28.33, df = 1/38, $p < .001$).

A 3 x 2 analysis of variance on recall of the Phase I list after learning of the Phase II list revealed no significant differences among learning potential groups, between mediation and control conditions, nor was there an interaction of the two factors.

With the same 3 x 2 design, an analysis of variance was performed on errors to criterion for relearning. List I means and SDs are reported in Table 8. The results of this analysis, summarized in Table 9, revealed only a significant difference among learning potential groups (F = 4.28, df = 2/23, $p < .05$). Multiple comparisons using the Scheffe test and the .10 level of significance recommended by Scheffe revealed no difference

Table 7

Analysis of Variance Summary Table:
Errors to Criterion in Paired Associates Learning
of the Learning Potential Groups

Source	df	MS	F
Between	29		
Treatments (A)	1	1867.7777	3.2724
Learning potential groups (B)	2	4422.0333	7.7476*
A X B	2	137.8111	.2414
Error (B)	24	570.7555	
Within	60		
Phase (R)	2	3839.0333	47.9396**
A X R	2	2723.5444	34.0100**
B X R	4	56.8166	.7094
A X B X R	4	93.4277	1.1666
Error (W)	48	80.0805	
Total	89		

*$p < .005$

**$p < .001$

Table 8

Means and SDs of Errors in Relearning of List I

LP Status	Experimental		Control	
	mean	SD	mean	SD
NG	22.80	16.12	22.00	19.89
G	26.75	26.04*	20.40	14.05
HS	1.20	1.79	8.00	12.39

Note: Values were based on five observations per group except where denoted by an asterisk signifying four observations.

Table 9

Analysis of Variance Summary Table:

Errors on Relearning List I

Source	df	MS	F
Treatments (A)	1	.1020	.0003
Learning Potential (B)	2	1130.4520	4.282*
A X B	2	108.9520	.4127
Error (B)	23	263.98	
Total	28		

*$p < .025$

between gainers and nongainers both of whom made significantly more errors on relearning than the high scorers.

To determine whether the learning potential groups used syntactical mediation in functionally different ways the number of List II stimulus and response intrusions (See Table 10 for means and SDs) in the List I recall trial were subjected to a 3 x 2 analysis of variance. The single significant result was an interaction between learning potential groups and treatments (Table 11). By repartitioning the learning potential and the learning potential x treatments effects comparisons were made between the experimental mediation and control groups at each level of learning potential. Nongainers in the two groups did not differ significantly (F = 1.16, df = 1/23). Gainers in the experimental mediation condition had significantly more List II intrusion on recall of List I than the controls (F = 9.28, df = 1/23, $p < .01$). In contrast, high scorers in the mediation condition had significantly fewer intrusions (F = 10.41, df = 1/23, $p < .005$).

Discussion

The picture paired associates learning performance of the special class children in this study was comparable to the pretest performance of such children in a learning potential evaluation. That is, the performance of the high scorers was similar to that of regular class children, while that of the nongainers and gainers was inferior. The analogy between the conditions of the present study and the conditions of the learning potential evaluation broke down beyond the initial untrained pretest. The gainers at no time emerged as distinctively more able than the nongainers on the paired associates learning task. Importantly, however, the performance of

Table 10

Means and SDs of the Number of List II Intrusions on Recall of List I

LP Status	Experimental		Control	
	mean	SD	mean	SD
NG	1.00	1.41	1.60	1.52
G	2.50	1.80*	.80	.84
HS	1.00	.71	2.80	.45

Note: Values were based on five observations per group except those denoted by an asterisk which were based on four observations.

Table 11

Analysis of Variance Summary Table:
List II Intrusions in the Recall of List I
as a Function of Learning Potential

Source	df	MS	F
A	1	.4083	.2623
B	2	.9083	.5835
A X B	2	7.9083	5.0808*
Error (B)	23	1.5565	
Total	28		

*p <.025

the high scorers was superior to the other special class children and did not differ significantly from either of the regular class comparison groups. Moreover, within the special class sample, a correlation of $\underline{r} = -.51$ ($\underline{p} < .01$) was obtained between learning potential status (3 point scale) and errors on Phase I paired associates learning compared to a correlation of $\underline{r} = -.18$ between IQ and errors. These findings are consonant with those obtained by Budoff et al (1970) where the criterion was non verbal science performance. It provides further support for the predictive validity of the learning potential assessment paradigm.

While verbal mediation training improved the performance of all of the ability groups, compared to the controls, as has been found in other studies (e.g., Jensen and Rohwer, 1963; MacMillan, 1970) it did not have a differential effect on any of the groups, although the improvement of the more able groups may have been truncated by a ceiling effect. Phase III comparisons of the learning potential groups indicated either a failure to adopt the mediation strategy or at least no distinct advantage of having previously used the mediation strategy relative to practice effects gained by the control groups. These findings appear to be consonant with those of Budoff et al., indicating the possibility of a general verbal mediation deficit shared by all three learning potential groups. But the use of the verbal mediational strategy might have been facilitated if the training sessions had been more frequent and the test trials closer in time to training than the four weeks in this study.

The most important point, however, is that all the learning potential groups benefited from the verbal mediation training, demonstrating the ability to use verbal mediation to effectively aid their learning, even though they might not have used it spontaneously after one short training session. It may be that they have a verbal production rather than a verbal mediation deficit, i.e., verbal mediation once produced facilitated learning (Flavell, Beach, and Chinsby, 1966). A more extended and intensive training and cuing regimen may ultimately result in spontaneous use of the verbal mediation strategy by IQ defined educable mental retardates.

The relative performance of the learning potential groups on List I relearning was similar to that of the initial learning performance, i.e., high scorers made fewer errors than nongainers and gainers, the latter groups not differing from each other. Comparison of List I recall showed no difference in memory function among the learning potential groups.

Although the groups did not differ in initial recall of List I, the List II intrusion errors suggested that there may have been subtle effects of the verbal mediation training which differentiate the gainer and the high scorers. Gainers in the mediation condition had more intralist intrusions than their controls, while the reverse was true for the high scorers in the mediation condition who had fewer intralist intrusions than their controls.

In general, the results indicated that children in special classes are able to use verbal mediation strategies to facilitate their learning whether or not they are inclined to do so spon-

taneously. Further laboratory study is required to determine whether one can train these children to use verbal mediation strategies spontaneously.

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Footnotes

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[2]Now with the Mentally Retarded Juvenile Offender Project, Peabody College, Nashville, Tennessee, 37203.

Phase I - Pretraining Instructions

Today and in the next few weeks you will have a chance to win a free movie ticket. You can win the ticket by earning points with some picture problems I'll show you in a minute. The kids who earn the most points will win movie tickets.

Here is what you will be doing.

Look at this card (show star-box). It has two pictures on it. What is this one (point to star). That's right! It's a _____ (subject's name for star). Now, what is this one (point to box)? That's right! It's a _____ (subject's name for box). (When the subject could not generate a label of his own, he was given the standard name.)

What I want you to do is remember that the _____(subject's name for box) goes with the _____(subject's name for star), so that when you see just the _____(subject's name for star) (the experimenter shows the star card)...like this, you can tell me what picture goes with it. Do you have the idea. Let's do it one more time.

Here is the card with two pictures again. What is this picture (the experimenter points to star)?... And what is this picture... (the experimenter points to box)? O.K. Now, here is the card with only one picture on it--the _____(subject's name for star). What picture goes with it? Good (if he got it right)! Now let's do a couple more for practice.

Study Trial

What is this picture? That's right! It's a _____(subject's name for book). And what is this picture? That's right! It's a _____(subject's name for cone). Remember that the _____

(subject's name for cone) goes with the _____(subject's name for book), so that when you see just the _____(subject's name for book) by itself, you can tell me that the _____(subject's name for cone) goes with it.

Here is the next one. What is this picture? That's right! It's a _____(subject's name for flower). And what is this picture? That's right. It's a _____(subject's name for pumpkin). Remember, the _____(subject's name for pumpkin) goes with the _____(subject's name for flower), so that when you see just the _____(subject's name for flower), you can tell me that the _____(subject's name for pumpkin) goes with it.

What is this picture (the experimenter points to star)? And what is this one (points to box). Remember that the _____(subject's name for box) goes with the _____(subject's name for star) so that when you see just the _____(subject's name for star) you can tell me that the _____(subject's name for box) goes with it.

Test Trial

Here is the _____(subject's name for book) again. What picture goes with the _____(subject's name for book)?

Now, what picture is this?..... And what picture goes with it? (flower-pumpkin).

And what picture goes with this one? (star-box)

(Subjects who got any one or more of the pretraining test trial items correct may continue with instructions. Subjects failing to get an item correct repeat the study and test trial sequence up to two additional times. If he still fails to get one item corect, exclude him from the study.)

Phase I - Criterion Task Instructions

In this box is a machine which will show you more pictures on this screen. I'm going to let you run the machine yourself. You push this button to see the first pictures. Tell me what the pictures are and remember that the two pictures go together just like you remembered that the _____(subject's name for star) and the _____(subject's name for box) went together. Remember which pictures go together so that when you see just one of the pictures by itself, you can tell me what picture goes with it.

On the first study trial, the experimenter recorded the subject's names for both the stimulus and the response pictures, providing him the standard label if he was unable to name the picture. On the second trial the child was told to study the pictures any way he wished, either out loud of silently.

Phase II - Experimental Group Instructions

First Study Trial

Today I am going to give you a new set of pictures so you can earn more points for the free movie ticket. You do it the same way you did last time. You push this button and two pictures come on the screen. Tell me what the picture on this side is (point to left of screen) and then tell me what the picture on this side is (point to right of screen).

After you have named the pictures I want you to make up a sentence about the two pictures. (The experimenter holds up book-ice cream cone card.) For example you could say: The book fell on the ice cream cone. Or another sentence could be: The book was eating the ice cream cone. You see, you can make up any kind of sentence you want to.

(The experimenter holds up flower-pumpkin card.)

Here are two pictures for you to make up a sentence about just for practice. First tell me what this one is (points to flower). And what's this one (points to pumpkin)? Good! Now make up a sentence about the flower and the pumpkin.

Use your sentence to help you remember that the two pictures go together so that when you see just one of the pictures you can tell me what picture goes with it.

Go ahead. Tell me what the pictures are and make up a sentence about them so that you can remember that they go together.

Second Study Trial

Now you can study the pictures any way you want to. You can study them out loud or you can study them to yourself. It doesn't matter to me how you study them. Just learn them the way that is easiest and best for you.

Phase II - Control Group Instructions

Today I am going to give you a new set of pictures so you can earn more points for the free movie ticket. You do it the same way you did last time. You push this button and two pictures come on the screen. Tell me what the picture on this side is (point to left of screen) and then tell me what the picture on this side is (point to right of screen). I want you to remember that the two pictures go together...(hold up book-ice cream cone example card) just like last time, when you learned that the ice cream cone goes with the book. Then when I showed you the book by itself like this...(hold up book card)...you told me that

ice cream cone went with it.

Go ahead. Tell me what the pictures are and remember that they go together.

Study Trial II:

Now you can study the pictures any way you want to. You can study them out loud or you can study them to yourself. It doesn't matter to me how you study them. Just learn them the way that is easiest and best for you.

Recall and Relearning Instruction

Recall Trial

Today I'm going to show you the first set of pictures again, the pictures you saw seven weeks ago. To start with you will see just the one picture on the screen. Try to tell me what picture goes with it. That is, try to remember the picture that goes with the one on the screen as you saw them three weeks ago. Here is your button. Start when you're ready.

First Study Trial

Now study the pictures silently to yourself--not out loud--and try to remember which pictures go together, so that when you see just the one picture you can tell me what picture goes with it.

Phase III - Instructions

The child was shown in an unsystematic manner a photocopy of all stimulus and response pictures and instructed to, "Tell me what each of these pictures is."

The PA task was then introduced with these instructions:

"Today I am going to give you a new set of pictures. Study the pictures any way that you want to. Learn and remember that the two pictures go together, so when you see just one of the pictures, you will be able to tell me what picture goes with it. Go ahead.